

## FIRST REPORT OF GLYPTOTHORAX IGNICULUS FROM INDIA WITH A NOTE ON FISH DIVERSITY OF THE CHAKPI RIVER NORTHEAST, INDIA

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### ABSTRACT

*This paper presents a first report of Glyptothorax igniculus Ng & Kullander (2013) from India. A checklist of the fish fauna of Chakpi River is presented, based on the present collection and those reported by the earlier workers. A total of 90 species of fishes belonging to 53 genera and 21 families are recorded from the river. Based on the IUCN status, the fish fauna of the river includes five endangered, six vulnerable, nine near threatened, forty five least concern and four data deficient. Highest species composition was observed in Cyprinidae family followed by Sisoridae. The fish fauna of the river is a mixture of endemic hill stream, Burmese and some widely distributed forms.*

**KEYWORDS:** First Record, Freshwater Fish, Biodiversity, Northeast & India

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### INTRODUCTION

Fishes constitute more than one-half of the total number of the recognized living species of vertebrates, yet expanding with newly described species. In the last 20 years, about 7000 fish species, including Indian fishes have been added to the world's total species of fishes (Eshmeier & Fong, 2017). Indian freshwater fish comprised of 1027 species, of which 858 are primary belonging to 167 genera, under 40 families and 12 orders (Gopi et al., 2017).

North east India is a biodiversity rich region. The region is drained by four major important drainages viz., the Brahmaputra, the Barak-Surma-Meghna, the Kaladan, and the Chindwin. The Chakpi River is an important tributary of the Chindwin-Irrawaddy drainage. It lies in the Indo-Burma region, one of the hottest biodiversity hotspots of the world. The mountainous torrential water forms an ideal habitat for the varied hill-stream fishes. The Chakpi originates in the mountain peaks of Tengnoupal, at an elevation of 1041 m asl near Larong village bordering the Indo-Myanmar region in the Chandel district of Manipur. The river flows southwest, joins the Manipur River at Sugnu and then flows 3 km southward between Chandel and Churachandpur districts, through a narrow gorge to join the Chindwin River in Myanmar.

Little has been done on the fish fauna of the Chakpi River, inspite of the exceptionally rich diversity. The ichthyofaunal inventory of the upper Chakpi River is far from accessibility, owing to difficult hilly terrain, transport problems and security reasons. There has been no comprehensive ichthyological survey conducted in the river until recently. There is no information about the fish fauna of the Chakpi River in the scientific literature, except that some of the new species described by Manojkumar & Vishwanath (1995), Shangningam & Vishwanath (2013 & 2016) and Nebeshwar & Vishwanath (2015) have their type locality in this river.

In the present study a systematic checklist of fish fauna of the river is prepared based on the present collection and those reported by the earlier workers. The status of the fishes and some conservation strategies of the threatened species are also provided.

## MATERIALS AND METHODS

The fishes of the Chakpi River have been surveyed between from April, 2011 to May 2017. Specimens were collected generally from fishermen who used different nets, traps and local fishing techniques. Methods of collecting the fishes differ depending upon their habit and size. Specimens were fixed in 10% formalin and preserved in ethanol. General measurements and counts follow Hubbs & Lagler (1947) and Kottelat (2001). For *Garra*, *Pethia*, *Psilorhynchus* and *Schistura*, the methods respectively, of Kullander & Fang (2004), Kullander (2008), Conway & Kottelat (2010) and Kottelat (1990) were followed. Counts and measurements of catfishes followed Ng & Lim (1995) with some modifications. Identification of species of the remaining genera followed Jayaram (1999) and Talwar & Jhingran (1991). The specimens were also identified, by comparing with type and others specimens in the Manipur University Museum of Fishes (MUMF) and Zoological Survey of India, Kolkata (ZSI). The families have been arranged phylogenetically following classification of fishes Nelson (2006) and species under alphabetic sequence. The correct zoological name with author citation, local name in Anal dialect and status (IUCN, 2010) are shown against each other.

## RESULTS AND DISCUSSIONS

The Chakpi River, an important tributary of the Chindwin-Irrawaddy drainage, lies in the Indo-Burma region, one of the hottest biodiversity hotspots of the world. The biodiversity of the river is characterized by high species richness, occurrence of many endangered, threatened, endemic and charismatic freshwater fish species of great interest. Many of them are important food fishes and are potential candidates as ornamental fishes. Interestingly, the river is a home to the freshwater hill-stream fish of taxonomic interest, many unnamed and undescribed species.

A checklist of the fish fauna of the Chakpi River in Manipur is provided in Table 1. The present study includes 90 species of 53 genera under 21 families and 7 orders. Four species were described new from the river viz., *Psilorhynchus microphthalmus* Vishwanath & Manojkumar (1995), *P. chakpiensis*, *P. konemi* Shangningam & Vishwanath (2013 & 2016) and *Garrachakpiensis* Nebeshwar & Vishwanath (2015). *Psilorhynchus rowleyi* Hora & Misra (1941) and *P. breviminor* Conway & Mayden (2008), described from the Irrawaddy drainage of Myanmar have also extended their occurrence in the Chakpi River (Shangningam et al., 2013; Shangningam & Vishwanath, 2016). Two species of *Glyptothorax* and another one species, each of *Schistura* and *Danio* are under description (could be new to science).

*Glyptothorax igniculus* is reported here for the first time from India. Ng & Kullander (2013) described *Glyptothorax igniculus* from Myittha River, Sagaing Region, approximately 8 km of Kalaymyo, Myanmar. Our collection of fishes in Chakpi River at Dujang included specimens of *Glyptothorax* which fully agrees with the description of *G. igniculus*. *Glyptothorax igniculus* is characterised, by having body sub cylindrical, head depressed, triangular in lateral view (Figure 1); barbels in four pairs, maxillary barbel long extending just beyond base of last pectoral-fin ray; thoracic adhesive apparatus present, consisting of ridges of in elliptical field extending from isthmus to level of last pectoral-fin ray base, with lanceolate median depression on posterior half almost enclosed posteriorly by skin ridges (Figure 2); pectoral spine broad with 9–12 serrae anterior; dorsal fin with i, 6 rays, adipose fin with anterior margin straight or very slightly concave, pelvic fin with i, 5 rays; tip of adpressed fin not reaching anal-fin origin; anal fin with iii, 8, i rays and caudal

fin strongly forked, lower lobe slightly longer than upper lobe. Thus the range of distribution of the species extends upto Chakpi River, Chindwin drainage in Manipur, India.

The present study on the fishes of Chakpi River basin in Manipur reveals high species diversity. It shows that the river has varied ecological conditions. The region being purely isolated and hill stream results in large numbers of endemic species. The river supports endemic hill stream fishes having both ornamental and food values. The type of habitat in the hill streams includes swiftly flowing with a gravel bottom, rocky bed substrate and numerous riffles. For much of the year water is cool, clear, shaded and flow rates are high. However, heavy rain causes these streams to swell into muddy torrents suddenly many times and this may continue only for few hours. In the plains or lower parts, the rivers are clayed and turbid during rainy season. This difference in ecological conditions is the main cause of species diversity and high endemism. The bottom of the torrential stream consists of boulder, cobble, pebbles and gravels often forming an impenetrable barrier to upstream movement of heavy body fishes. Only fishes having slim and streamlined body exist in such torrential streams (e.g., *Balitora*, *Homalopteroids*, *Garra*, *Glyptothorax*, *Psilorhynchus*, *Schistura*, etc).

Cyprinidae forms the largest family followed by Sisoridae with 13, Nemacheilidae with nine, Bagridae with six, Psilorhynchidae with five, Channidae and Cobitidae with four, Botidae, Balitoridae, Siluridae and Clariidae with two species and the rest of the family are represented by one species each, respectively (Figure 3). Family Cyprinidae represented maximum number of species, with 31 species under 19 genera.

According to the IUCN redlist assessment of eastern Himalayas (2010), the majority of threatened fishes are in the Chindwin Basin in Manipur. Many of the species endemic to the Chindwin basin in Manipur are assessed as Endangered, Vulnerable and near threatened. The remaining species are at least concern or lower risk category. The present study includes five endangered, six vulnerable, nine near threatened, forty five least concern and four data deficient categories of fish in the river. Five endangered viz., *Pethiamanipurensis*, *Schisturakanjupkhulensis* and *Psilorhynchusmicrophthalmus*, *Schisturareticulata* and *Clariasmagur* are found in the river. *Pethiamanipurensis*, *Schisturareticulata* and *S. kanjupkhulensis* are facing habitat loss, due to sand and gravel mining for construction and urban development near their habitats. Re-inventory of *Psilorhynchusmicrophthalmus* is necessary, as it is not seen after its description in 1995. Fish sanctuaries for the protection of the threatened species may be established at suitable portion of the river.

The proposal of hydroelectric power project in several regions of northeast India by National Hydro Project Corporation and the proposed Chakpi multipurpose project at Chakpikarong, for power generation of 7.5 MW may create conflict with freshwater biodiversity affecting the fish fauna. Habitats of several hill stream fishes may be disturbed and upstream and downstream parts of the river may also be fragmented. There are threats to the fishes in the Chakpi River due to destructive fishing, including explosives, poisoning and dynamiting, as well as the use of fish barrages.

The Chakpi River harbours rich diversity of fishes. It also depicts high endemism due to the fact that water bodies are purely isolated hill streams. Many interior areas have never been visited by an ichthyologist and several species are still awaiting discovery. More studies are needed to understand the biology, population trend, nutritional quality etc. so as to categorize them in respect of threat criteria, value for farm culture etc. At the same time, the revalidation of many species in the river is needed to resolve the taxonomic ambiguity for future ichthyological research.

## CONCLUSIONS

Chakpi River is endowed with immense resources of nature. From the present study, it appears that, Chakpi have rich ichthyofaunal diversity. The river is gifted with rich fish fauna of taxonomic importance. The anterior hill streams have not been fully explored due to different inaccessibility problems. Maintaining the diverse fish fauna is essential. Timely scientific survey, research and conservation are the need of the hour.

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**Table 1: Systematic Checklist, Local Name, Status and Remarks of the Fish  
Fauna of the Chakpi River, Manipur**

	Local Name	IUCN status	Remarks
Phylum <b>CHORDATA</b>			
Subphylum <b>VERTEBRATE (CRANIATA)</b>			
Super class <b>GNATHOSTOMATA</b>			
Class <b>ACTINOPTERYGII</b>			
Division <b>TELEOSTEI</b>			
Subdivision <b>OSTEOGLOSSOMORPHA</b>			
Order <b>OSTEOGLOSSIFORMES</b>			
<b>Family NOTOPTERIDAE</b> Bleeker, 1859			
1. <i>Notopterus notopterus</i> (Pallas, 1769)	Ngaphe	LC	High food value
Subdivision <b>ELOPOMORPHA</b>			
Order <b>ANGUILLIFORMES</b>			
<b>Family ANGUILLIDAE</b> Rafinesque, 1810			
2. <i>Anguilla bengalensis</i> (Gray, 1831)	Pa-ngul	NT	Catdromous fish which migrate to Bay of Bengal for spawning
Subdivision <b>OSTARIOCLUPEOMORPHA</b>			
Superorder <b>OSTARIOPHYSI</b>			
Order <b>CYPRINIFORMES</b>			
<b>Family CYPRINIDAE</b> Rafinesque, 1815			
<b>Subfamily Cyprininae</b>			
3. <i>Chagunius nicholsi</i> (Myers, 1924)	Ngaran	LC	High fishery potential
4. <i>Neolissochilus hexagonolepis</i> (McClelland, 1839)	Ngatra	NT	High cold water fishery potential
5. <i>N. stracheyi</i> (Day, 1871)	Ngatra	LC	High cold water fishery potential
6. <i>Poropuntius burtoni</i> (Mukerji, 1933)	Ngashang-evum	LC	High fishery potential
7. <i>Tortor</i> (Hamilton, 1822)	Ngashun	NT	High fishery potential
<b>Sub family Barbinae</b>			
8. <i>Hypsibarbus myitkyinae</i> (Prasad & Mukerji, 1929)	Ngashang	LC	High fishery potential
9. <i>Pethiamanipurensis</i> (Menon, Rema Devi & Vishwanath, 2000)	Ngapem	EN	High ornamental value
10. <i>P. ornata</i> (Vishwanath & Juliana, 2004)	Ngapem	VU	High ornamental value
11. <i>P. stoliczka</i> (Day, 1870)	Ngapem	NA	High ornamental value
12. <i>Puntius schola</i> (Hamilton, 1822)	Ngapemeson	LC	High ornamental value

Table 1: Contd.,				
13.	<i>P. sophore</i> (Hamilton, 1822)	Ngapemesin	LC	High ornamental value
14.	<i>Schizothoraxrichardsonii</i> (Gray, 1832)	Nagting-pasuh	VU	High coldwater fishery potential
Subfamily Labeoninae				
15.	<i>Banganadevdevi</i> (Hora, 1936)	Ngashang	LC	High fishery potential
16.	<i>Garraabhoyai</i> Hora, 1921	Ngapahnu	NA	High ornamental value
17.	<i>G. chakpiensis</i> Nebeshwar&Vishwanath	Ngapahnu	NA	Endemic & type locality deposited in MUMF
18.	<i>G. gravelyi</i> (Annandale, 1919)	Ngapahnu	NT	Fishery potential
19.	<i>G. nambulica</i> Vishwanath&Joyshree, 2005	Ngapahnu	VU	Ornamental potential
20.	20. <i>G. namyaensis</i> Shangningam&Vishwanath, 2012	Ngapahnu	NA	Ornamental potential
21.	21. <i>G. paralissorhynchus</i> Vishwanath&Shanta, 2005	Ngapahnu	VU	Ornamental potential
22.	<i>Tariqilabeoburmanicus</i> (Hora, 1936)	Nga-uh-nu	NA	High fishery potential
23.	<i>Labeodyocheilus</i> (M'Clelland, 1839)	Ngatang	LC	High food value
Subfamily Rasborinae (Danioninae)				
24.	<i>Amblypharyngodon. mola</i> (Hamilton, 1822)	Hakhachara	LC	Ornamental fish
25.	<i>Bariliuslairokensis</i> Arunkumar&Tombi, 2000	Ngaphal	NT	Ornamental andhigh food value
26. <i>Danioquagga</i> Kullander, 2009		Hapangal	NA	High ornamental value
27.	27. <i>D.sp</i>	Hapangal	NA	Under description
28.	28. <i>Devarioacuticephalus</i> (Hora, 1921)	Hapangal	LC	High ornamental value
29.	<i>D.aequipinnatus</i>	Hapangal	LC	High ornamental value
30.	<i>Esomusdanrica</i> (Hamilton, 1822)	Ngashang-chara	LC	High ornamental fish
31.	<i>Opsariusbarnoides</i> (Vinciguerra, 1890)	Ngaphal	LC	High food value
32.	<i>O. dogarsinghi</i> (Hora, 1921)	Ngaphal		High ornamental value
33.	<i>Raimasguttatus</i> (Day, 1870)	Ngaphal-esang	LC	High food value
Family PSILORHYNCHIDAEHora, 1925				
34. <i>Psilorhynchusbreviminor</i> Conway &Mayden, 2008		Ngathanu	DD	High ornamental value
35.	<i>P. chakpiensis</i> Shangningam&Vishwanath, 2013	Ngathanu	NA	Endemic
36.	<i>P. microphthalmus</i> Vishwanath&Manoj, 1995	Ngathanu	EN	Endemic, not found after its description
37.	<i>P. rowleyi</i> (Hora&Misra, 1941)	Ngathanu	NA	Migrated from Myanmar
38.	<i>P. konemi</i> Shangningam&Vishwanath, 2016	Ngathanu	NA	Endemic
Family BOTIIDAE Berg, 1940				
39.	<i>Botiahistrionica</i> Blyth, 1860	Ngating-pasuh	LC	High ornamental value
40.	<i>Synchrossusberdmorei</i> (Blyth, 1860)	Ngating-pasuh	NA	High ornamental value

Table 1: Contd.,			
<b>Family COBITIDAE</b> Fitzinger, 1832			
41. <i>Lepidocephalichthysberdmorei</i> (Blyth, 1863)	Ngakicharoh	LC	High food value
42. <i>L. guntea</i> (Hamilton, 1822)	Ngakicharoh	LC	High food value
43. <i>L. micropagon</i> (Blyth, 1860)	Ngakicharoh	LC	High food value
44. <i>Pangiopangia</i> (Hamilton, 1822)	Hashin	LC	Ornamental value
<b>Family BALITORIDAE</b> Swainson, 1839			
45. <i>Balitoraburmanica</i> (Hora, 1932)	Hlung-ngha	LC	High ornamental value
46. <i>Homalopteroidsrupicola</i> (Prashad&Mukerji 1929)	Hlung-ngha	NA	High ornamental value
<b>Family NEMACHEILIDAE</b> Regan, 1911			
47. <i>Acanthocobitiszonalternans</i> (Blyth, 1860)	Ngashe-pahral	LC	Ornamental value
48. <i>Neonoemacheiluspeguensis</i> (Hora, 1929)	Ngashe-pahral	DD	Ornamental value
49. <i>Physoschisturaprasadi</i> (Hora, 1921)	Ngadin-hadin	DD	Ornamental value
50. <i>P. chindwinensis</i> Lokeshwor&Vishwanath, 2012	Ngadinhadin	NA	Ornamental value
51. <i>Schisturakangjupkhulensis</i> (Hora, 1921)	Ngashe-pahral	EN	Endemic to Manipur River system
52. <i>S. manipurensis</i> (Chaudhuri, 1912)	Ngashe-pahral	NT	Ornamental value
53. <i>S. reticulata</i> Vishwanath&Nebeshwar, 2004	Ngashe-pahral	EN	Endemic to Manipur River system
54. <i>S. sikmaiensis</i> (Hora, 1921)	Ngashe-pahral	LC	Ornamental value
55. <i>S. sp</i>	Ngashe-pahral	NA	Under description
Order SILURIFORMES			
<b>Family AKYSIDAE</b> Gill, 1861			
56. <i>Akysisprashadi</i> Hora, 1936		LC	Highly torrential form
<b>Family SISORIDAE</b> Bleeker, 1858			
57. <i>Bagariusbagarius</i> (Hamilton, 1822)	Ngatang	NT	High fishery potential
58. <i>B. yarrelli</i> (Sykes, 1839)	Ngatang	NT	High fishery potential
59. <i>Gagatadolichonema</i> He, 1996	Ngarah	LC	High Ornamental value
60. <i>Glyptothoraxburmanicus</i> Prasad &Mukerji, 1929	Ngachalbah	LC	Highly torrential form
61. <i>G. granulus</i> Vishwanath&Linthoingambi, 2007	Ngachalbah	LC	Highly torrential form
62. <i>G. igniculus</i> Ng &Kullander, 2013	Ngachalbah		Reported first time from India
63. <i>G. dorsalis</i> Vinciguerra, 1890	Ngachalbah		Highly torrential form
64. <i>G. ngapang</i> Vishwanath&Linthoingambi, 2007	Ngachalbah	LC	Highly torrential form, Endemic to Manipur river system
65. <i>G. trilineatus</i> Blyth, 1860	Ngachalbah	LC	Highly torrential form

Table 1: Contd.,				
66.	<i>G. sp 1</i>	Ngachalbah	NA	Under description
67.	<i>G. sp 2</i>	Ngachalbah	NA	Under description
68.	<i>Myersglanisjayarami</i> Vishwanath& Kosygin, 1999	Hlung-ngha	VU	Highly torrential form
69.	<i>Pseudecheneisukhrulensis</i> Vishwanath& Darshan, 2007	Ngachalbah- isang	VU	Highly torrential form
Family SILURIDAE Cuvier, 1816				
70.	<i>Pterocryptisberdmorei</i> (Blyth, 1860)		LC	Fishery potential
71.	<i>Wallagoattu</i> (Schneider, 1801)	Sareng	NT	High food value
Family CLARIIDAE Bonaparte, 1846				
72.	<i>Clariasmagur</i> (Hamilton, 1822)	Ngakra	EN	High fishery potential
73.	<i>Heteropneustesfossilis</i> (Bloch, 1974)	Ngachi	LC	High food value
Family SCHILBEIDAEBleeker, 1858				
74.	<i>Eutropiichthysburmannicus</i> Day, 1877	Ngahlii	LC	Fishery potential
Family BAGRIDAEBleeker, 1858				
Subfamily Bagrinae				
75.	<i>Hemibagrusmicrophthalmus</i> (Day, 1877)	Nganal	LC	Big sized fish with high fishery potential
76.	<i>Mystusfalcarius</i> Chakrabarty& Ng, 2005	Ngasey	LC	Fishery potential
77. 2011	<i>M. ngasep</i> Darshan, Vish. &Mahanta,	Ngasey	NA	Endemic to Manipur River system
78.	<i>M. pulcher</i> (Chaudhuri, 1911)	Ngasey	LC	Highly torrential form
79.	<i>M. rufescens</i> (Vinciguerra, 1890)	Ngasey	LC	Highly torrential form
Subfamily Batasinae				
80.	<i>Batasioaffinis</i> Blyth, 1860		DD	Ornamental fish
Subdivision EUTELEOSTEI				
Superorder ACANTHOPTERYGII				
Series ATHERINOMORPHA				
Order CYPRINODONTIFORMES				
Family APLOCHEILIDAEM'Clelland, 1838				
81.	<i>Aplocheiluspanchax</i> Hamilton, 1822		LC	Widely available
Series PERCOMORPHA				
Order SYNBRANCHIFORMES				
Family SYNBRANCHIDAEswainson, 1838				
82.	<i>Monopterusjavanensis</i> La Cepède, 1800	Ngapurum	LC	Widely distributed
Family MASTACEMBELIDAEswainson, 1839				
83.	<i>Mastacembelusarmatus</i> (La Cepède, 1800)	Ngaparul	LC	High food value
Order PERCIFORMES				
Family GOBIIDAE Cuvier, 1816				
84.	<i>Glossogobiusgiurus</i> (Hamilton, 1822)	Nylon ngha	LC	Widely distributed
Family ANABANTIDAE Bonaparte, 1831				
85.	<i>Anabas testudineus</i> (Bloch, 1792)	Nghasamche	DD	High food value
Family OSPHRONEMIDAE van der Hoeven, 1830				
86.	<i>Trichogasterlabiosa</i> Day, 1877	Thipahraechacha	LC	Widely distributed
Family CHANNIDAE Fowler, 1934 (1831)				
87.	<i>Channagachua</i> (Hamilton, 1822)	Ngawo	LC	Widely distributed
88.	<i>C. marulius</i> (Hamilton, 1822)	Ngawo	LC	High food value

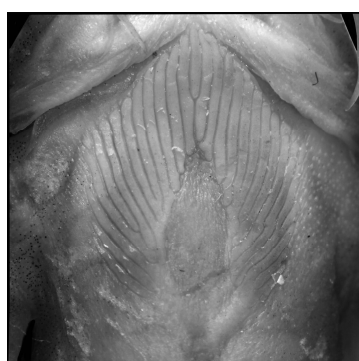


Table 1: Contd.,			
89.	<i>C. punctata</i> (Bloch, 1793)	Ngawo	LC
90.	<i>C. striata</i> (Bloch, 1793)	Ngawo	LC

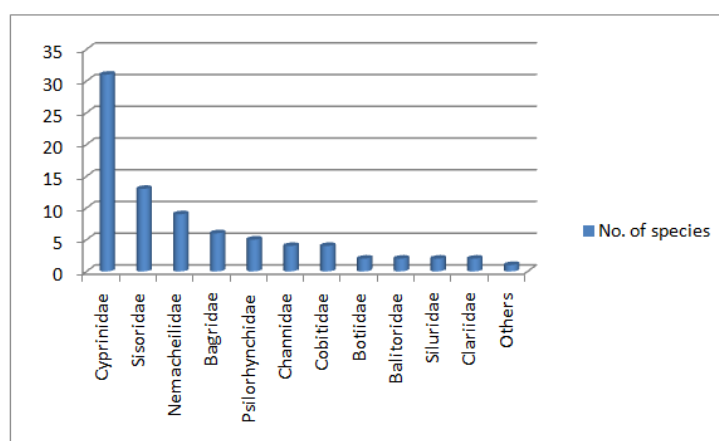
**NB:** LC-Least Concern, EN-Endangered, VU-Vulnerable, DD-Data Deficient, NA-Not Assessed, NT- Near Threatened.



**Figure 1:** Lateral view of *Glyptothoraxigniculus*, ZSI 7088, 52.1 mm SL.



**Figure 2:** Thoracic Apparatus of *Glyptothoraxigniculus*



**Figure 3:** Fish Diversity of Chakpi River in Manipur, India

